

Appl. No. 10/708,426
Amdt. dated March 22, 2005
Reply to Office action of February 01, 2005

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

- 5 1. (Currently amended) A method for forming a damascene interconnect structure with a bi-layer capping film, comprising the following steps:
- providing a semiconductor wafer;
- depositing a dielectric layer over the semiconductor wafer, the dielectric layer having a main surface and a damascened recess on the main surface;
- 10 depositing a copper layer in the damascened recess and to fill the damascened recess;
- performing a chemical mechanical polishing process to polish the copper layer such that the copper layer has an exposed upper surface substantially co-planar with the main surface of the dielectric layer; and
- 15 capping the exposed upper surface with a bi-layer capping film consisting of a lower HDPCVD silicon nitride layer and an upper ~~doped silicon carbide~~ oxygen doped silicon carbide layer.
2. (Original) The method according to claim 1 wherein after polishing the copper layer to form the upper surface and before capping the exposed upper surface with the bi-layer capping film, the upper surface is pre-treated by hydrogen or ammonia plasma for reducing residual copper oxides on the upper surface.
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3. (Original) The method according to claim 2 wherein the hydrogen or ammonia plasma pre-treatment is carried out at a temperature of below 300°C for a time period of about 10 seconds to 60 seconds.
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4. (Original) The method according to claim 1 wherein the lower HDPCVD silicon nitride layer is formed by high density plasma chemical vapor deposition (HDPCVD) at a temperature of below 350°C.

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5. (Canceled)

6. (Original) The method according to claim 5 wherein the upper doped silicon carbide layer is produced by a chemical vapor deposition (CVD) process, in which 3-methyl
10 silane or 4-methyl silane is used as a precursor.